

DHANWANTARI, THE VEDIC FATHER OF MEDICINE AND PHYSICIAN OF THE GODS HOLDING THE GOBLET OF IMMORTALITY

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Frontispiece

A SHORT ACCOUNT OF

THE ANTIQUITY OF HINDU MEDICINE

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INTRODUCTION

In these pages the reader is introduced to a brief survey of the antiquity of Hindu medicine and civilisation. European scholars, perhaps prejudiced by the present position of India, have been reluctant to admit the claims of the Hindus as to the antiquity of their civilisation. But the recent remarkable discoveries at Harappa and Mohenjo-Daro in the Punjab and Sind have revived a romantic interest in India's civilisation, and have helped to confirm her high antiquity. The sands of Sind, the deep alluvial soil deposited by the annual flooding of the Indus through the long ages, have, like the ashes from Vesuvius that buried Pompeii, been hiding in their bosom for some five thousand years the secret of a forgotten people and their prehistoric civilisation,

which is now being unearthed by the efforts of Sir John Marshall and his Indian co-workers. Beneath the uppermost stratum of the mounds of Mohenjo-Daro their excavations have disclosed "layer beneath layer of earlier cities, each built on the ruins of its predecessor." They have exhumed many of the ancient streets and dwelling-houses or shops "furnished with their own wells and bath-rooms, floored over with brick, and provided with covered drains connecting with larger drains in the side-streets." They have also recovered a valuable collection of jewellery, gold and silver bangles, ear ornaments, gold netting-needles, handsome necklaces, exquisitely engraved seals, earthen jars of all sizes, lovely pottery vases, cremation urns, etc. As Sir John Marshall says, "the gold ornaments are so well finished and so highly polished that they might have come out of a Bond Street jeweller's of today rather than from a prehistoric house of 5,000 years ago." In fact, the

existence of roomy and well-built houses with bath-rooms, of an extraordinarily well-developed system of drainage, the character of jewellery and other antiquities, betray "a relatively high degree of luxury and social condition of the people much in advance of what was then prevailing in Mesopotamia or Egypt."

So far Sir John Marshall and his assistants have discovered nine buried cities, and there may be three, four, or five more ancient cities buried under the portions which still remain to be excavated—which bring their period to somewhere near 7000 to 9000 B.C. Though it is premature to draw any definite conclusions at present, these archeological discoveries no doubt open up some of the forgotten chapters in the history of ancient India, and are likely to throw considerable light on the soundness of India's persistent belief that from Northern India on the plains of Septa-Sindhu (the Land of Seven Rivers) the Aryan Hindus made their

earliest home, which may be called "the cradle of civilisation."

One word more. The discovery of some specimens of cinnabar among the ruins suggests not only that these ancient people knew how to extract mercury from this mineral at so remote an age, but indirectly proves the claim of the Hindus to their priority in making mercury and its preparations a speciality.

A SHORT ACCOUNT OF THE ANTIQUITY OF HINDU MEDICINE

" Then—let me dive into the depths of Time,
And bring from out the ages that have rolled
A few small fragments of those wrecks sublime,
Which human eye may never more behold; . . ."
" Shrine of the mighty ! Can it be
That this is all remains of thee ?"

The history of Hindu medicine, when examined from materials available at the present day and studied without prejudice or preconceived ideas, takes us back to the very cradle of Aryan civilisation. From the earliest times India captured the imagination of the world. A glory of romance and a veil of splendour cast a mystic spell upon all her achievements. Whether it be in the domain of art or science, in poetry or philosophy, in religion or mythology, in commerce or manu-

facture, ancient India excelled in almost every department of human activity or enterprise for many, many centuries. The European mind, which has hitherto been in the habit of tracing all its science and knowledge to Greece, cannot understand or admit the claims of the Hindus for the antiquity of their medicine. It is true that men like Dr. Wise,[1] Neuberger, etc., have long ago pointed out that it is to the Hindus we owe the first system of medicine, and others like Wilson, Heyne, Ainslie, Royle, Dutt, Thakore Saheb, Jolley, and Hoernle, have done much to elucidate the prominent part India played in the ancient history of medicine. Though it is admitted that the records of Hindu medicine may be traced as far back as the time of Buddha (sixth century B.C.), the claims of the Hindus to be the most ancient civilised people were thought to be based on tradition, and were dismissed by the Western historians as lacking tangible proof. But in recent times the diligent

work of Indian Sanscrit scholars has done much to confirm the high antiquity of Hindu civilisation. By the close study of the hymns of the Rig Veda, the oldest literary monument of Aryan thought, scholars like Tilak,[2] Das, Mookerji, Bannerjee, Sircar, Law, etc., have unearthed a most romantic story of Aryan life and civilisation stretching back to prehistoric times, and even to geological epochs. From their research of Vedic literature they have traced the gradual development of the human mind step by step, and have constructed a history of the ancient Aryan people, their civilisation, culture, and medicine, just as truly and unmistakably as ancient Babylon and Assyrian history have been demonstrated from the writings on stones and clay bricks, and from their ruins and monuments.

The Antiquity of Indo-Aryan Civilisation.

As the medical history of the Indo-Aryans forms an inseparable part of the history of their civilisation, the proof of the antiquity of their medicine can be found in the antiquity of their civilisation. India occupies a foremost place in the ancient history of the world. As Count Bjornstjerna[3] says, no nation on earth can vie with the Hindus in the antiquity of their civilisation and their religion. The Bacterian document,[4] found in Kashmir and brought to Europe by Sir William Jones, gives us an entire register of Hindu kings, and proves that India enjoyed splendid civilisation 6000 B.C. This is further proved by the history gathered from the recent rendering of the Vedic hymns, which take one back to immemorial antiquity. These hymns have shown that Vedic Aryans migrated and planted colonies in different parts of the world which

became centres of civilisation in Persia, China, Egypt, Phœnicia, Babylonia,[5] and still later in Greece and Rome,[6] and later still in countries in the Far East, including Pegu, Siam, Cambodia, Java, Sumatra, Borneo, and Islands of the Malay Archipelago.[7] The Druids in ancient Britain were considered to be Buddhist Brahmans,[8] and the Scandinavians to be the descendants of the Hindu Kshatriyas.[9] The Indians were the inventors of numerical figures and the decimal system. "To them," as Professor Monier Williams[10] says, "is due the invention of Algebra, Geometry, and their application to Astronomy."

As religion profoundly influenced the daily life and thought of the Hindus, they cultivated those sciences that most helped them in their worship. Hence their sciences of Astronomy, Geometry, and practical Anatomy are very old. Even European scholars like Cassini, Bailly, Gentil, and Playfair maintain that there are Hindu observations extant which must have

been more than 3000 years B.C., and which evinced even then a high degree of astronomical science. Of all the ancient nations, the Hindus alone had wellnigh accurately determined the rate of motion of the precession of the Equinoxes. The great antiquity of astronomy is the best proof of its originality. In the twelfth century A.D., Bhaskara expounded the law of gravity and the principle of Differential Calculus, thus anticipating Newton by many centuries. The geometrical theorem of the forty-seventh proposition, Book I., which tradition ascribes to Pythagoras, was solved by the Hindus at least two centuries earlier. They invented fables and fairy-tales which have been translated into almost every modern language and have become the nursery stories among the children of the whole world. The art of writing has been known since the Vedic times[11]—at least 4000 B.C. Bjornstjerna says that the Hindus possessed written books of religion

before 2800 B.C., or 800 years before Abraham. They invented a language of unrivalled richness, harmony, and inflection — Sanscrit — which is the mother of all European languages. Cotton paper was used in India before the Christian Era. The Vedas, the sacred writings of the Hindus, are recognised as the greatest work in all literature. Their systems of philosophy are lofty and sublime, and are admired even to the present day. Their achievements in commerce[12] are just as great as their science and philosophy. They built ships with a thousand oars and with sails, navigated the seas, and undertook long voyages.[13] They exported in ancient times gold and silver brocades, shawls and muslins, cotton and silk, pearls and rubies. King Solomon in his trading ships brought from India sandalwood, ivory, and precious stones, apes and peacocks, ebony and gold; and even before his time her trade in spices and aromatics, perfumes and precious stones, was

extensive in Chaldea, Babylon, Assyria, and Palestine. Through Alexandria, the great emporium of the East, her rich merchandise went to Egypt, Persia, Greece, and Rome. In fact, modern scholarship has brought to light evidence that from North India, from the plains of Septa-Sindhu[14] (the Land of Seven Rivers), there developed a most wonderful civilisation the streams of which went to fertilise the whole world and benefit the entire human race.

Medicine in the Rig Vead—4000 to 2500 B.C.

The Hindu system of medicine, known as Ayur Veda (the science of life), forms a part of the Vedas, or revealed knowledge, and is said to come from Brahma, the Creator and the fountain-head of all learning. Recent investigations have placed the Rig Vedic times at least 4000 B.C. The later hymns of the Rig Veda introduce us to a period of a well-developed

civilisation (the earlier hymns take us further back to Miocene and Pliocene epochs[15]), when the Indo-Aryans settled down near the modern Punjab, building villages and towns, domesticating the sheep, goat, cow, horse, ass, and the elephant, and cultivating rice, millet, and barley. We read of kings and queens, magistrates, village officers, treasurers, revenue officers, the circulation of gold and silver coins, and other signs of established government. We read also of the various uses of principal metals, such as gold, silver, copper, and iron, of women wearing gold ornaments set with precious stones, and drinking from gold and silver cups. Also there are proofs of the existence of guilds and numerous arts and crafts, showing their economic progress in arts and manufacture in that remote period.[16] And mention is made of meetings and assemblies[17] (sabha) with presidents, held in village halls for debate, social intercourse, for general conversation,

and for gambling. Side by side with the social, economic, and industrial advance of the period medicine also flourished. When the Aryan people were engaged in fighting other clans and tribes, we read of surgeons attending the camps and battlefields, removing injured eyes, replacing them by artificial ones, extracting arrow-shafts from the limbs of Aryan chiefs and soldiers, amputating injured legs and substituting iron ones.[18] The warriors wore helmets, breastplates, and iron mail coats on their bodies and skin gloves on their hands. In times of peace and prosperity, when Aryan nobles travelled in stately carriages drawn by fiery horses, there were constant accidents to the latter, which were attended to by a class of surgeons who devoted themselves to the treatment of injured animals. Already in Vedic India medicine had so far advanced that the followers of the healing art were divided as surgeons (shalya vaidyas), physicians (bhisaks), and magic

doctors (bhisag atharvans). The physicians lived in houses surrounded by gardens containing medicinal plants which they collected and codified. The properties of a new drug were always praised in the Rig Veda, which gives the names of a thousand and one medicinal plants, and praises the virtues of water as an all-healer, and certain trees and herbs as purifiers of the atmosphere. The surgeons attended the ladies and acted as accoucheurs, gave medicine to relieve pain and suffering.[19] It is remarkable that Indians were so early acquainted with the three humours of the body[20] which were destined to influence the medical world for thousands of years, and with the use of metals for therapeutic purposes. There is an entire hymn of the Rig Veda devoted to the description and treatment of phthisis. In fact, in the Rig Vedic period, there were already signs of advancement in surgery, midwifery, medicine, and therapeutics, child management, and sanitation.

Medicine in Atharva and Ayur Vedas.

The medical system introduced in the Rig Vedic times takes a more definite shape in these later Vedas. Atharva Veda contains the oldest literary monument of Indian medicine. Besides the employment of charms and spells and medicinal herbs and plants in the cure of leprosy, jaundice, dropsy, scrofula, etc., it contains (in the tenth book) a hymn on creation, where several parts of the skeleton are carefully and orderly enumerated. Another hymn alludes to the use of catheters in ancient times. Ayur Veda describes the means of keeping health, the causes of disease, and the means of curing them. It is divided into eight sections: (1) Surgery; (2) diseases of the eye, ear, the mouth and nose; (3) general diseases, like fevers, consumption, diabetes, etc.; (4) mental therapeutics; (5) diseases of children; (6) antidotes for poisons; (7) rasayana, or chemistry; (8) means of strengthen-

ing the generative organs. It is the oldest systematic work on medicine which formed the basis of the writings of subsequent medical authors for many centuries. It can only be seen in fragments of manuscripts, and Sir William Jones,[21] writing about it, says: "I have myself met with curious fragments of that primeval work; and in the Veda itself, I found, with astonishment, an entire Upanishad on the internal parts of the human body, with an enumeration of the nerves, veins, and arteries; a description of the heart, spleen, and liver, and various disquisitions on the formation and growth of the fœtus."

In the next stage we come across the school of physicians and surgeons. Indra, the supreme God, communicated Ayur Veda to Atreya, who taught Agnivesa, Bhela, Harita, etc., each of whom became celebrated authors of medicine. Charaka revised the work of Agnivesa. Thus began the college of physicians headed by Atreya, whose

work, *Atreya Samhita*, is the oldest existing work on medicine, containing 46,500 verses in all. Dhanvantari was the father of Hindu medicine, as Æsculapius was among the Greeks. He taught his pupil Susruta the art of surgery. He is said to be the divine physician, and brought from the ocean a cup of Amrita, the drink of immortality, to mortals. As the head of the school of surgeons, he held his great Ayur Vedic university in the city of Benares.

The Epic Period—2500 to 600 B.C.

In the epic period the Indo-Aryans reached the zenith of their glory and civilisation, and like the Victorian Age of the present day, produced a galaxy of great men in every department of life—great kings, warriors, administrators, poets, and philosophers. It was the time of Ramayana, "the noblest of epics," of Kanada the philosopher, who gave for the first time a clear exposition of the atomic theory, of the rise of mighty kingdoms and

empires, of extensive wars and conquests which culminated in the great war of Mahabharata, when India shook with the armies of rival kings ranging themselves between Pandavas and Kauravas, who employed infantry, cavalry, chariots, and elephants, and "flying balls emitting the sound of a thunderbolt,"[22] when a great number of warriors perished, whole tribes and races were killed or dispersed. The Aryan power broke up after the war, and India suffered a terrible and irretrievable loss, while the rest of the world gained by her sons emigrating to distant lands like Egypt, Greece, etc., and carrying with them the germs of their civilisation. In proof of the high state of civilisation at the time of Mahabharata, it is recorded that a beautiful palace was built for the Pandavas at Khandavaprastha by Maya Danava, an expert architect. The city was surrounded by a trench on all sides, and there was a high rampart outside the moat intersected by gates with

lofty towers. Inside there were fine buildings, lovely gardens, lakes, and tanks.[23] The laws of war were humane and honourable. No harm was inflicted on non-combatants, or on a warrior without armour, or while asleep or fatigued or in grief in any way, or who surrendered. At this time there were army surgeons and physicians attached to every court, small or great. The court physicians waited upon the king and looked after his health. The army surgeons were fully equipped with every necessary medical and surgical appliance,[24] regularly accompanied the army in the field, and undertook both minor and major operations. Sushena was the principal surgeon of Rama (of Ramayana), who also had a vaidya as his personal physician. In the war of Mahabharata, both the conflicting armies had distinguished surgeons on their staff. Duryodhana, the chief of the Kurus, when pierced with arrows, was made by the surgeons to sit in a tub filled with medicated water, under

which he was freed from the missiles lodged in his flesh.[25] The wounded in war were treated in tents, and the tent of the surgeon-general was close to that of the king. The Ramayana tells us that a restorative called Sànjivani was given to bring the patient back to consciousness after a wound was inflicted on the battlefield. It was also employed after an operation such as trephining in which an anæsthetic had been used, to counteract its after-effects. The Vedic physicians possessed a considerable knowledge of the process of digestion, the properties and functions of fat, muscles, tendons, ligaments, cartilages, etc. The three humours of the body were considered to be the fundamental principles which maintained a healthy equilibrium of the organism. They are *vayu*, nerve force; *pitta*, metabolism and heat production; and *kapha*, which presides over heat regulation, and mucous and glandular secretions. The Mahabharata also describes the principle of the

circulation of the blood: "The ducts leading from the heart go up and down and in transverse directions; they transport the best juices of the food."[26] These glimpses at the period of the epics—the Ramayana and Mahabharata—give us an idea of the state of proficiency surgery and medicine achieved in so early an age.

In the epic period, we come across two celebrated medical men—**Charaka and Susruta**—whose books were considered as standard works on Hindu medicine for many, many centuries, and were revised and re-edited by many successive Indian doctors down to the time of Bhava Misra—A.D. 1550—who marks the last revival of Aryan Vedic literature. In the intervening centuries, so many medical men were called after them that their names were confused and mistaken for the original Charaka and Susruta.

Charaka was a *great physician and* philosopher, and a man of high culture and *intellect. His book on medicine*

is voluminous, is divided into eight parts, and contains 120 chapters. He deals with various diseases of the heart, chest, abdomen, genital organs, and lower extremities; their causes, symptoms, and treatment. He devotes chapters to diet, drugs, antidotes for poisons, medical instruments and appliances. He mentions the use of syringes, emetics, purgatives, and enemas. He gives elaborate instruction for the erection and furnishing of a hospital for the rich, for the construction and provision of a lying-in room and the child's room, where he advises the bedding, coverings, and sheets should be purified by steam and by fumigation. So minute are his instructions on equipment in the child's room that he orders that a variety of toys to please the child should be at hand, which should be coloured, light, musical, and beautiful, and not be sharp-pointed. And withal he is so scientific that his Logic of Therapeutics is taken as " the most signal example of scientific method

worked out with systematic carefulness."[27]

Susruta was the son of Visvamitra, a contemporary of Rama. He was a great surgeon. Though his work is mainly devoted to surgery, it also includes medicine, pathology, anatomy, midwifery, biology, ophthalmology, etc. His book was an attempt to arrange systematically the surgical experiences of the older surgeons, and to collect the scattered facts on medicine from the Vedic literature. If Charaka is superior to Susruta in the accuracy of description, classification of diseases, and the general plan of treatment, Susruta excels him in anatomical descriptions and in the treatment of surgical diseases. He classifies all surgical operations into five different kinds, and groups them under: extractions of solid bodies, excising, incising, probing, scarifying, suturing, puncturing, and evacuating fluids. He enumerates 101 varieties of blunt instruments and twenty different kinds

of sharp instruments, which should have an edge so fine as to divide the hairs on the skin. They are chiefly made of iron, and include scalpels, lancets, saws, scissors, needles, hooks, probes, directors, sounds, forceps, trocars, catheters, syringes, bougies, and a rectal and vaginal speculum. Most of the modern surgical instruments are only slight modifications of those used by the ancient Hindu surgeons. The surgeon, before commencing an operation, is enjoined to equip himself with all the necessary things, such as the instruments, salts, bandages, honey, oil, water, etc. He should have practical experience of his art, and should execute his work with a light hand, and have by his side steady and strong assistants. The patient should be allowed to take light food before an operation, while abdominal operations and operations in the mouth or about the anus should be performed when the patient is fasting. The sick-room should be fumigated with the vapours

of resinous gums, etc., and incense should be burnt in the operation room, and afterwards the wound sterilised by fumigation—all of which foreshadow the antiseptic theory of the present day. To Susruta is attributed the discovery of cataract-crouching, which was entirely unknown to the Greeks, the Egyptians, or any other nation. It was he who first successfully demonstrated the feasibility of mending a torn ear-lobe with a skin flap taken from the neck or adjoining part, and after him Indian surgeons became experts in rhinoplastic operations. Also limbs were amputated, abdominal sections were performed, fractures and dislocations set, hernia and ruptures were reduced, hæmorrhoids and fistula were removed with a success that will come as a surprise to European surgeons. Certain medicinal plasters were applied to localise the shafts of arrows embedded in the wounded limbs of soldiers, and the exact location ascertained from the inflammation caused

by such an application with a precision that reminds one of Röntgen rays.

The use of anæsthetics was not unknown to the Hindus. Both Charaka and Susruta mention the use of medicinal wines to produce insensibility to pain. Susruta distinctly lays down that "wine should be used before operation to produce insensibility to pain." The Hindus also used the fumes of burning Indian hemp (*Cannabis indica*) as an anæsthetic at a period of great antiquity, and later they also employed other drugs for the same purpose. In A.D. 927, a cranial operation was performed on King Bhoja of Dhar by two brother surgeons, who made the King insensible by a drug called Samohini, trephined the skull, removed a growth from the brain, closed the opening, and stitched the wound. Another drug (Sanjivani) was given to restore consciousness after the operation.[28]

It is in practical midwifery that one becomes impressed with the skill and

ability of Susruta. The different turning, flexing, and gliding movements, the application of forceps in cases of difficult labour, and other obstetric operations involving the destruction and mutilation of the fœtus, such as craniotomy, were first systematically described by Susruta (in *Ṣusruta Samhita*) many centuries before Christ. After delivery, Susruta says: "Wash with hot water." There was no sepsis in Susruta's labour rooms because he took care to use clean hands and boiled water—thus anticipating aseptic surgery of modern times. His advocacy of Cæsarean section in hopeless cases of obstruction, his directions regarding the management of the puerperal state, lactation, the rearing of the child, the choice of a wet-nurse, etc., are practically the same as may be found in any modern book. He was the first to advocate dissection of dead bodies as indispensable for a successful surgeon. As Dr. Wise observes: "The Hindus were

the first scientific cultivators of the most important and essential of all the departments of medical knowledge, practical anatomy." To acquire efficiency in the art of surgery, the Hindu teachers made their pupils practise different operations on various substances. For instance, incision was practised on Pushpaphala (*Cucurbita maxima*), evacuating on leather bags full of water and on the urinary bladders of dead animals, scarification on the hides of animals, venesection on the vessels of dead animals and on the stalks of the water-lily. Ligaturing and bandaging were practised on dummies, suturing on pieces of cloth, skin, or hide, application of caustics and the actual cautery on pieces of flesh, and catheterisation on unbaked earthen vessels filled with water.[20]

In chemistry, Susruta describes the methods of preparing oxides, sulphates, and chlorides of six metals—tin, iron, lead, copper, silver, and gold. In the preparation of caustic alkalies, his

direction that the strong lye is to be "preserved in an iron vessel" is a proof, as Sir P. C. Ray says, of the high degree of perfection in scientific pharmacy achieved by the Hindus at such an early age.[30] In medicine, the method of direct auscultation was probably known to Susruta, as he says: "By the ear can be heard the sounds of air bubbling in the phlegm in the wind passages"—which seems to refer to the crepitations or râles heard in pneumonia and other lung diseases. Space will not allow us to give even an outline of his writings on diet, hygiene, public health, materia medica, operations on the eye, etc. Truly he had an encyclopedic mind. He and Charaka represented the state of Hindu medicine of their age. They laid a strong foundation of medicine, surgery, therapeutics, etc., enlarged and broadened the stream of knowledge they themselves received from others, and passed on to successive generations till it permeated and fertilised almost every nation far and wide.

Buddhist Period—600 B.C. to A.D. 600.

During the time of Buddha and the advent of Alexander, there were a number of republics and monarchies in India and strong and brave soldiers, though they lacked unity and combination. Towns grew round kings' palaces; attached to each of them there was a public gambling-place and hot-air baths. The people of India lived mainly in the villages, and constructed and maintained public halls (mote halls), rest houses, reservoirs, village roads, and parks. Women also took part in such public work, and, as Rhys Davids says, there were no landlords and no paupers. Every town had its mote hall covered with roof but no walls, where business, administrative and judicial functions were carried out. The birth of Buddha marked not the beginning but the decline of the glory of Hindu civilisation. While anatomy formed a part of the preliminary course of study in medicine

and surgery in ancient India, and dissection was enthusiastically recommended by Susruta, and at least down to the time of Vagbhata, the influence of Buddhism tended to discourage the study of anatomy, dissection, and surgery. For ethical reasons Buddha (and his followers) put a stop to animal sacrifices, and would not permit the dissection of animals, while he gave support and stimulus to medicine, and established hospitals for man and beast all over the country. The university of Taxilla was specially famous for its medical school, where arts and sciences were taught by distinguished teachers. The university at Nalanda had 100 lecture rooms, where 10,000 students received instruction; it had six immense blocks of residential buildings, each being four stories high (*Modern Review*, March, 1915, p. 334). Science and medicine continued to flourish during the advent of the Greeks in India. Jivaka, the personal physician of Buddha, practised cranial surgery with

success. A class of physicians specialised in toxicology. Arrian,[31] the Greek historian, tells us that while Greek physicians were unable to deal with cases of snake-bite among the Greek soldiers, Alexander was obliged to consult the Indian physicians, who successfully treated these cases. Nearchus says that the King was so struck with their skill that he employed them in his camp, ordered the Greek soldiers to consult them, and took back some of the professors on Hindu medicine on his homeward march.

Medicine in the Reign of Chandragupta, Fourth Century B.C.

In the reign of Chandragupta,[32] who was called the first Emperor of India, there was constitutional government with the king at the head, and ministers who had charge of separate departments. The people were free, and not one of them was a slave. The chief city, like Patna, was managed by a

municipal board, and the army was organised by the commander-in-chief. Every stranger in the city had to be notified. Trade was carried on both by land and sea, and harbours and shipyards for river and ocean-going vessels were provided. There were hospitals and store-rooms containing medicines in large quantities. The care and treatment of the sick and foreigners formed one of the duties of the government, and physicians with medicines and appliances had to be kept in readiness to meet emergencies. The army surgeons, with surgical instruments and appliances, oils, bandages, and nurses, accompanied the army, and their presence encouraged the soldiers. Also veterinary surgeons were employed for the treatment of horses and elephants. Medicinal plants and herbs were cultivated both on the land and in pots. The state controlled and regulated the medical practice. A register of births and deaths was kept. Every case of

dangerous disease had to be reported by the physician, failing which he was fined. Penalty was also imposed if a death was caused by carelessness on the part of the physician. Measures were taken to ward off pestilence, when physicians had to distribute medicines and priests carry out purificatory ceremonials. Extermination of pests like rats, locusts, insects, and tigers was put into force. All cases of violent death caused by suffocation, hanging, drowning, or poisoning had to undergo post-mortem examination, and medical officers had to find out the cause of death and report the matter to the law court.

Medicine from the Time of Asoka till Sixteenth Century A.D.

Asoka (third century B.C.), Chandragupta's grandson, was a benevolent monarch, became a Buddhist, and gave up war and hunting—the two pastimes of kings. He put an end to the

slaughter of animals. In his reign the poor, the sick, and the aged received help. Charitable hospitals were established for men and animals all over his extensive kingdom; medicinal herbs and roots and fruit-trees planted throughout the country; and hospices were erected stored with food and drink, where physicians were stationed with medicines to attend to travellers and poor persons. The arts and sciences attained a high degree of excellence. Buddhist monks studied philosophy and medicine and chemistry in different monasteries, and in the famous universities at Benares, Taxilla (Rawalpindi), Vidarbha (Berar), and Nalanda (Bihar) became skilled physicians and travelled as missionaries to such distant lands as Greece, China, Tibet, etc., carrying with them both the knowledge of Buddhism and Hindu medicine, together with medical books and manuscripts, medicinal herbs and plants. While from the time of Buddha surgery, anatomy, and dis-

section steadily declined, the study of medicine and chemistry attained great importance from the humanitarian and philanthropic activity of Buddhism; and when it declined the vigorous impulse it gave to the revival of science and literature continued, producing great men like Kalidasa and Bhavabhuti (poets and dramatists), Brahmagupta and Aryabhata (mathematicians and astronomers), Samkhara and Ramanuja (philosophers and religious leaders), Patanjali, Nagarjuna, and Vagbhata (chemists and physicians). From this time onward chemistry, which gradually evolved from Rasayana in Ayur Veda, from Tantric cult in Atharva Veda, and from Susruta, showed great activity. Patanjali (300 to 150 B.C.) was the redactor of Charaka and the founder of Yoga philosophy, which paved the way for Tantric mysticism and alchemy. He was an expert in making iron preparations, and discovered the use of mixtures called vidas which contained

aqua regia in potentia. Nagarjuna (first century A.D.) studied at the university of Vidarbha, and became a celebrated physician and alchemist. He was the redactor of Susruta, and was the first to introduce black sulphide of mercury, which does not cause salivation. Nandi was the inventor of the process of sublimation and of the kosthi apparatus for extracting the essence of metals. And so Hindu chemistry, which developed along independent lines, made great strides in metallurgic processes such as calcination, distillation, sublimation, extraction, killing, etc., and in the manufacture of chemical industries. Varamahira (A.D. 587) alludes to the preparations of "cements strong as thunderbolt," to experts in the composition of dyes, cosmetics, and perfumery; Vasavadatta to the preparation of coagulated mercury, of a chemical powder the inhalation of which would bring on sleep or deep stupor, to a powder which, like anæsthetic drugs or curare, para-

lyses motor and sensory organs. To these classes of professional experts in chemical arts were due three of the great Indian discoveries which enabled India to command the markets of the East and the West for more than a thousand years; the preparation of fast dyes for textile fabrics; extraction of indigotin from indigo plant; and the tempering of steel, a process to which the medieval world owed its Damascus swords.[33]

Almost the last of the great men that shed lustre on Hindu medicine was Bhava Misra, who lived at Benares in A.D. 1550, where he is said to have taught no less than four hundred pupils. He compiled a voluminous work on anatomy, physiology, medicine, surgery, materia medica, and therapeutics. He also mentions the circulation of blood (a century older than Harvey), and the prescription of mercury in syphilis (Phiranga Roga). Syphilis made its appearance in the sixteenth century when the Portuguese settled

in India. The Hindu physicians could not account for this disease, as all their medical writings from the time of Charaka and Susruta were silent on the subject, while they gave accurate descriptions of all other diseases of genital organs, and so they called it Phiranga Roga (Portuguese disease), and administered mercury in the form of calomel and inhalation.

Hindu Medicine in the Arabian Period—A.D. 600 to 1600.

This period witnesses the slowing down of the fires of Hindu medicine. From its glowing embers it has lighted the torch of Arabian medicine, and through it the medicine of Europe. In the seventh century the great works of Charaka and Susruta were translated into Arabic under the patronage of Caliph Almansur. In the reign of Harun-al-Rasid (A.D. 786), the ministerial family of Barmek engaged Hindu scholars to come to Bagdad, made

them chief physicians of their hospitals, and ordered them to translate from Sanscrit to Arabic, books on medicine, pharmacology, toxicology, philosophy, astrology, and other subjects. Manka, a Hindu, was a personal physician to the Caliph, cured him of a dangerous illness, and translated a work on poison by Charaka from Sanscrit to Persian. What India contributed reached Bagdad either directly in translations from the Sanscrit or indirectly from Sanscrit into Persian, and from thence into Arabic.[34] In treating by leeches, Avicenna gives nearly the very words of Susruta, and the name of Charaka repeatedly occurs in Latin translations of Avicenna, Rhazes, and Serapion. So that, as Sir William Hunter says, "The Hindu medicine is an independent development. Arab medicine was founded on the translations from the Sanscrit treatises, and European medicine down to the seventeenth century upon the Latin versions of Arabian medicine."

Conclusion.

In this brief survey of the history of Hindu medicine, we have roughly traversed from 4000 B.C. to A.D. 1600—a period of 5,600 years. The researches of modern Sanscrit scholarship have confirmed the old belief that India presents a history running back to antiquity, and has been the cradle of Aryan civilisation. Her medicine is as old as her civilisation and commerce. Her people worked out, among other things, the atomic theory, the evolution theory, the theory of motion, of gravity, of sound, of light and heat potential, the presence of ether, the diurnal motion of the earth, the principle of differential calculus, the calculation of lunar periods and eclipses, the humoral theory, and the circulation of blood, centuries before they became known to Europe. They were the inventors of numerical and decimal symbols, of mathematics and algebra, of chess and fables now used all over the world.

They were the first to practise dissection of the human body, first to provide dispensaries and hospitals for men and animals, first to employ minerals and mercury internally, first to introduce skin-grafting and plastic surgery, cataract-crouching, and major operations like amputation, lithotomy, Cæsarean section, etc. Their humoral theory, though misunderstood, dominated Greek, Roman, and Arabian medicine, and in Europe down to the eighteenth century. Many of their medicinal plants and drugs, spices and aromatics, have been incorporated in the materia medica of almost every nation. In fact, the influence of the medical works of the Hindus, their materia medica and plastic surgery, etc., can be detected in the Persian, Hebrew, Greek, Roman, Arabic, Chinese and Tibetan, and even in modern European medicine.[35] To the study of disease and its treatment, of chemistry and surgery, of materia medica and therapeutics, they brought

an acute mind and observation and an originality all their own. They early taught Europe when they gave *Datura stramonium* in asthma, cowitch in worms, nux vomica in paralysis and dyspepsia, arsenic in intermittent fevers, mercury in syphilis, salt-free diet in Bright's disease, flesh and fatty foods in consumption, and mild purgatives in the first stages of dysentery. They seem to have known all about auto-intoxication (*samata*) when they began the treatment of almost every disease by first attending to the bowels, and starved to some extent their fever patients.[36] They were early acquainted with some of the modern branches of medicine, such as hypnotism, hygiene, eugenics, massage, postural treatment, organo-therapy. Hypnotism originated among the Hindus, who took their sick people to their temples to be cured by hypnotic suggestion, or temple-sleep, as was done in Egypt and Greece in later times. Manu, the ancient law-giver, was a sanitarian, biologist, and eugenist.

He forbade marriage of an Aryan with a non-Aryan, because the latter was considered to be inferior in physical, intellectual, and moral qualities. A modern eugenist can go no further than Vasistha, a Vedic sage and another ancient law-giver, when, advising the desirability of marrying a bride from a good family, he says: "Even a horse is respected on account of his good genealogy, hence a lady of good genealogy should be taken into marriage."[37] The caste system is really at first aimed at the preservation and perfection of race culture rather than the division of labour. It was Patanjali who, in his Yoga sutras, prescribes various Asanas, or postures, for preventing and curing diseases. When the Hindus included in their pharmacopeia such things as fat, bile, bone marrow, blood, flesh, hoof, etc., they early anticipated the therapeutics of the present day which prescribes cod-liver oil, ox gall, bone marrow, hæmoglobin preparations, raw meat, and calf's-

foot jelly. So also their methods (as described in Rasayana and Vajikarana) of improving the virile power of generative organs, which, they say, contain a vital fluid necessary for the preservation of the health of the body, to ward off disease and age, and to restore vigour and immunity—which reminds one of Brown-Sequard's experiments with testicular extracts. They showed they were not blind to contagion when they forbade wearing the shoes, clothes, and garlands used by others, or drinking from the same vessel as others. When we add to these their knowledge of anæsthetics and the germ theory, we cannot but exclaim that there is nothing new under the sun.

Greek and Hindu Medicine.

European scholars, finding a similarity between the Greek and Hindu medicine, have raised a doubt as to the originality of the Hindus, just as

Cantor, the historian of mathematics, struck with the resemblance between Greek geometry and the Sulva sutras, concluded that Hindus were influenced by the Alexandrian school of Hero. The Sulva sutras, however, date from about the eighth century B.C., while the school of Hero was 215 B.C., nearly six centuries later. While about 1200 B.C. Kanada propounded his atomic theory that heat and light are different manifestations of the same substance, Democritus explained his atomic theory in 460-360 B.C. (*Modern Review*, November, 1909, p. 448). So also in medicine the Hindus, as Colebrooke[38] says, were teachers and not learners. For instance, the theory of humoral pathology was shared by both the nations, and M. Lietard very justly observes that if it could be proved that the doctrine of humoral pathology was broached in India anterior to the time of Hippocrates, not only would the originality of the Hindus be established, but that

of the Greeks would be compromised thereby.[39] As has already been shown, it was known to the Hindus at the time of the Rig Veda, at least 2000 B.C. —*i.e.*, many centuries before the birth of Hippocrates. So also the elemental theory of the Hindus and their physiological theory *that the same principles* which sustain life and the organism are *transformed into the dynamics* of disease were echoed by Hippocrates many centuries after. Royle has found beyond doubt the indebtedness of the Greeks and the Arabians to the Hindus. Even in the earliest of the Greek writers Indian drugs are mentioned by corrupted Sanscrit names. Many medicines produced in India were used by the early Greek physicians, whereas Indian medical treatises do not contain a single technical term which points to a foreign origin. So that an impartial scholar cannot but agree with Neuberger[40] when he says that "the trend of opinion today, informed by recent discoveries, is in favour of the

originality of Indian medicine in its most salient features."

Lastly, the secret of their splendid civilisation, their penetrating knowledge, their widespread influence among the nations of the world, lies in their grasp of the central fact that man is a spiritual being. Hence they subordinated their science and commerce, their social and industrial life, to that supreme factor. They commenced their daily life, the physicians visited their patients and performed operations, by first invoking Divine aid and blessing. Their spiritual culture, together with their social organisation and their asceticism in the midst of luxury and plenty, gave them a stability and a vitality which outlived the clash of empires and the storms of foreign conquest. The ideal of the Hindu physician was to save humanity regardless of earthly gain, as expressed by the great Charaka: "Not for self—not for the fulfilment of any earthly desire of gain, but solely for the good of

suffering humanity, should you treat your patients, and so excel all. Those who sell the treatment of disease as merchandise gather the dust and neglect the gold." They argued from the inner to the outer, and relied upon natural means of cure more than artificial aids and helps. They arrived at conclusions such as the doctrine of evolution, from introspective reflection and mental vision, rather than by the toilsome researches of the laboratory. To them the material was the *maya* (illusion), and the spiritual was the real. And in that reality they saw further and deeper, and achieved more than it would have been possible for the West.

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